

# SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-42

**Name:** Lake Thompson

**Counties:** Kingsbury and Miner

**Legal Description:** T110N-R55W-Sec.20-22, 28-33; T109N-R55W-Sec.4-9, 16-17;  
T110N-R56W-Sec.36; T109N-R56W-Sec.1.

**Location from nearest town:** 6 miles south and 4 miles east of DeSmet, SD.

**Dates of present survey:** August 3-5, 2009 (netting); Sept. 22, 2009 (electrofishing)

**Dates of last survey:** August 4-6, 2008 (netting); Sept. 22, 2008 (electrofishing)

Primary Game Species	Other Species
Walleye	Northern Pike
Yellow Perch	Black Crappie
	Smallmouth Bass
	Black Bullhead
	White Sucker
	Common Carp

## PHYSICAL DATA

**Surface area:** 12,455 acre

**Maximum depth:** 26 feet

**Volume:** 148,692 acre-feet

**Contour map available:** Yes

**OHWM elevation:** None set

**Outlet elevation:** None set

**Lake elevation observed during the survey:** 8 feet low

**Beneficial use classifications:** (4) Warmwater permanent fish propagation, (7) immersion recreation, (8) limited-contact recreation and (9) fish and wildlife propagation and stock watering.

**Watershed area:** 263,044 acres

**Mean depth:** 14.5 feet

**Shoreline length:** 44.6 miles

**Date mapped:** 2002

**Date set:** NA

**Date set:** NA

## Introduction

Lake Thompson, located in central Kingsbury County, was named for John Thompson, a pioneer farmer and Civil War veteran. Lake Thompson had been nothing but a shallow marsh until heavy precipitation in the early 1980s caused the lake to grow to over 16,000 acres and almost 30 feet in depth. It is now one of the more important fisheries in eastern South Dakota.

## **Ownership of Lake and Adjacent Lakeshore Properties**

The State of South Dakota Listing of Meandered Lakes lists 8,000 acres of the original lakebed as meandered. The balance of lake ownership is divided between private landowners, the South Dakota Department of Game, Fish, and Parks (GFP), and the United States Fish and Wildlife Service. The GFP Wildlife Division manages the fishery and Game Production Areas while the Parks Division manages the Recreation and Lake Access Areas.

## **Fishing Access**

The Northeast Access Area, located on the northeast corner of the lake, has a double lane boat ramp, dock, parking lot, public toilet and shore fishing access. The Lake Thompson Recreation Area, also located on the northeast shore of the lake, has a double lane boat ramp, dock, public toilet, parking lot, campgrounds, swim beach, and shore fishing access. The North Access Area, located on the northwestern shore of the lake, has a boat ramp, dock, public toilet and shore fishing access. The West Access Area, located on the west shore of the lake, has a double lane boat ramp, dock, public toilet, parking lot, and shore fishing access. Recent drought has lowered lake levels and some of these access areas were not usable in 2009.

## **Field Observations of Water Quality and Aquatic Vegetation**

During the lake survey, the Secchi depth measurement was 1.1 m (42.0 inches). Sago pondweed (*Potamogeton pectinatus*) was observed during the survey. Water temperatures were around 25.6°C (78 °F).

# **BIOLOGICAL DATA**

## **Methods:**

Lake Thompson was sampled on August 3-5, 2009 with five overnight gill-net sets and 11 overnight trap-net sets. The trap nets are constructed with 19-mm-bar-mesh ( $\frac{3}{4}$  in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh ( $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1, 1 $\frac{1}{4}$ , 1 $\frac{1}{2}$ , and 2 in) monofilament netting. Forty minutes of nighttime electrofishing was done on September 22, 2009 to evaluate walleye recruitment. Sampling sites are displayed in Figure 5.

## **Results and Discussion:**

## **Gill Net Catch**

Walleye (60.6%) and yellow perch (10.6%) were the most abundant species sampled in the gill nets this year (Table 1). Common carp, spottail shiner, white bass, northern pike, bigmouth buffalo, and black crappie were also sampled.

**Table 1.** Total catch from five overnight gill net sets at Lake Thompson, Kingsbury County, August 3-5, 2009.

Species	No.	%	CPUE <sup>1</sup>	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Walleye	109	60.6	21.8	±6.3	31.9	1	0	87
Yellow Perch	19	10.6	3.8	±1.9	23.9	95	11	119
Common Carp	16	8.9	3.2	±1.1	4.6	100	20	102
Spottail Shiner	16	8.9	3.2	±2.0	1.2	--	--	--
White Bass	16	8.9	3.2	±1.1	0.0	94	88	100
Northern Pike	2	1.1	0.4	±0.3	0.9	--	--	--
Bigmouth Buffalo	1	0.6	0.2	±0.3	0.2	--	--	--
Black Crappie	1	0.6	0.2	±0.3	2.2	--	--	--

\* 10 years (1999-2008)

**Table 2.** Catch per unit effort by length category for various fish species captured with gill nets in Lake Thompson August 3-5, 2009.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Walleye	1.6	20.2	20.0	0.2	--	21.8	±6.3
Yellow Perch	--	3.8	0.2	3.2	0.4	3.8	±1.9
Common Carp	0.2	3.0	--	2.4	0.6	3.2	±1.1
Spottail Shiner*	--	--	--	--	--	3.2	±2.0
White Bass	--	3.2	0.2	0.2	2.8	3.2	±1.1
Northern Pike	--	0.4	--	--	0.4	0.4	±0.3
Bigmouth Buffalo	--	0.2	0.2	--	--	0.2	±0.3
Black Crappie	--	0.2	--	--	0.2	0.2	±0.3

\*No length categories established. Length categories can be found in Appendix A.

## Trap Net Catch

Walleye (66.3%) and bigmouth buffalo (12.9%) were the most abundant species in the trap net catch (Table 3). Other species included northern pike, smallmouth bass, common carp, white sucker, and black crappie.

**Table 3.** Total catch from twelve overnight trap net sets at Lake Thompson, Kingsbury County, August 3-5, 2009.

Species	No.	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Walleye	108	66.3	9.0	±2.7	7.7	3	2	85
Bigmouth Buffalo	21	12.9	1.8	±1.3	0.1	10	10	91
Northern Pike	13	8.0	1.1	±0.3	3.5	85	46	75
Smallmouth Bass	10	6.1	0.8	±0.4	0.8	63	25	91
Common Carp	8	4.9	0.7	±0.3	8.3	--	--	--
White Sucker	2	1.2	0.2	±0.1	0.4	--	--	--
Black Crappie	1	0.6	0.1	±0.1	3.9	--	--	--

\* 10 years (1998-2007)

<sup>1</sup> See Appendix A for definitions of CPUE, PSD, and mean Wr.

**Table 4.** Catch per unit effort by length category for various fish species captured with trap nets in Lake Thompson August 3-5, 2009.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Walleye	0.8	8.2	8.0	0.1	0.1	9.0	±2.7
Bigmouth Buffalo	--	1.8	1.6	--	0.2	1.8	±1.3
Northern Pike	--	1.1	0.2	0.4	0.5	1.1	±0.3
Smallmouth Bass	0.2	0.6	0.2	0.2	0.2	0.8	±0.4
Common Carp	0.1	0.6	--	0.3	0.3	0.7	±0.3
White Sucker	--	0.2	--	--	0.2	0.2	±0.1
Black Crappie	--	0.1	--	--	0.1	0.1	±0.1

Length categories can be found in Appendix A.

## **Walleye**

**Management objective:** Maintain a walleye population with a gill-net CPUE of at least 20, a PSD range of 30-60, and a growth rate of 14 inches by age-3.

Walleye gill-net CPUE increased in 2009 (Table 5), however, no fish over age-3 and only 1 fish over 380 mm (15 in) was sampled. Age-2 fish comprised the majority of the 2009 catch (87%).

Walleye growth is slower than previously observed (Table 6). Although condition (mean  $W_r$ ) has varied little over the past five years (Table 5), the walleyes are not quite reaching 356 mm (14 in) by age-3. Declining water levels are likely reducing prey fish production and leading to poor growth of predator species.

**Table 5.** Walleye gill-net CPUE, PSD, RSD-P and mean  $W_r$  for Lake Thompson, Kingsbury County, 2000-2009.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	43.3	49.0	31.7	22.8	16.0	34.0	26.0	26.5	12.8	21.8	31.9
PSD	55	32	49	27	24	38	22	33	27	1	34
RSD-P	8	8	4	8	4	3	1	2	3	0	4
Mean $W_r$	90	90	94	83	89	91	88	90	88	87	90

\*10 years (1999-2008)

**Table 6.** Weighted mean length at capture (mm) for walleye captured in gill nets in Lake Thompson, Kingsbury County, 2003-2009. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends. Sample size in parentheses.

Year	1	2	3	4	5	6	7	8	9	10	11	12
2009 (109)	213 (4)	278 (95)	360 (10)	--	--	--	--	--	--	--	--	--
2008 (64)	212 (30)	343 (24)	--	441 (7)	--	--	493 (2)	--	495 (1)	--	--	--
2007 (91)	282 (48)	331 (8)	410 (28)	438 (4)	--	409 (1)	--	654 (1)	630 (1)	--	--	--
2006 (100)	290 (4)	343 (83)	403 (4)	--	466 (3)	464 (6)	--	--	--	--	--	--
2005 (133)	260 (73)	350 (6)	370 (15)	419 (24)	409 (10)	433 (1)	427 (1)	626 (2)	617 (1)	--	--	--
2004 (88)	262 (5)	321 (17)	347 (38)	375 (19)	472 (5)	508 (1)	532 (1)	607 (1)	--	681 (1)	--	--
2003 (138)	245 (10)	312 (86)	372 (9)	453 (10)	497 (15)	508 (6)	600 (1)	599 (1)	--	--	--	--

Only two 20-minute stations were completed during fall electrofishing because of problems with the electrofishing boat. Poor weather conditions did not allow a follow-up trip to finish the sampling. Few age-0 walleyes were captured suggesting a weak year class was naturally produced in 2009. Similar to 2008, the age-0 walleyes were small for fish belonging to a weak year class. Only three age-1 walleyes were captured, which was expected based on the 2008 age-0 walleye CPH. Age-1 walleyes were small for their age and in similar condition to past years.

**Table 7.** Age-0 and age-1 walleyes sampled during 2 hours of nighttime electrofishing on Lake Thompson, Kingsbury County, 1999-2009.

Year	Stocking	Age-0 CPH	80% C.I.	% stocked	Mean length (range; mm)	Wr	Age-1 CPH	80% C.I.	Mean length (range; mm)	Wr
2009	none	8	0-22		150 (147-154)	113	3		231 (229-233)	83
2008	none	13	7-18		149 (137-161)	103	110	73-147	236 (182-277)	83
2007	none	214	134-294		148 (111-195)	87	2	0-4	332 (324-347)	84
2006	fry <sup>†</sup>	43	29-57	4	203 (167-236)	91	2	0-2	324 (317-328)	85
2005	none	5	2-8		197 (181-200)	104	50	34-67	289 (250-323)	88
2004	fry	290	132-447	74	131 (110-170)	93	2	1-3	283 (270-290)	85
2003	none	16	6-26		169 (158-181)	94	4	2-6	255 (232-271)	83
2002	none	78	42-114		154 (127-186)	104	13	4-21	260 (218-188)	87
2001	none	202	136-268		169 (129-216)	105	10	6-13	257 (245-269)	89
2000	none	231	117-345		153 (120-192)	93	52	38-66	238 (203-290)	83
1999	none	155	99-211							

<sup>†</sup> Stocked with 17,935 large fingerlings (5.0/lb) after electrofishing was completed.

## Yellow Perch

**Management objective:** Maintain a yellow perch population with a gill-net CPUE of at least 30 and a PSD range of 30-60.

Yellow perch gill-net CPUE remains low (Table 8). The population age structure suggests limited natural recruitment with no large year classes produced since 2001 (Table 9). The yellow perch were in excellent condition and they grow very fast (Table 9).

**Table 8.** Yellow perch gill-net CPUE, PSD, RSD-P and mean Wr in Lake Thompson, Kingsbury County, 2000-2009.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	34.7	45.2	54.7	6.5	16.3	7.3	3.3	4.0	2.8	3.8	23.9
PSD	64	65	20	87	89	76	100	100	57	95	70
RSD-P	17	25	7	3	36	59	54	50	50	11	33
Mean Wr	116	117	117	110	112	107	112	122	117	119	114

\*10 years (1999-2008)

**Table 9.** Weighted mean length at capture (mm) for yellow perch captured in gill nets in Lake Thompson, Kingsbury County, 2003-2009. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends. Sample size in parentheses.

Year	1	2	3	4	5	6	7	8
2009 (19)	--	224 (18)	--	280 (1)	--	--	--	--
2008 (14)	156 (6)	--	241 (1)	276 (4)	303 (1)	--	308 (2)	--
2007 (12)	--	--	246 (5)	248 (3)	--	280 (4)	--	--
2006 (13)	--	224 (5)	--	--	272 (8)	--	--	--
2005 (29)	167 (6)	213 (3)	243 (1)	268 (18)	259 (1)	--	--	--
2004 (100)	153 (11)	--	243 (80)	263 (5)	288 (2)	261 (2)	--	--
2003 (39)	--	216 (35)	243 (4)	--	--	--	--	--

## **Black Crappie**

Black crappie CPUE remains very low (Table 10) due to limited recruitment. However, a spring trap netting effort yielded approximately 20 large crappies per net.

**Table 10.** Black crappie trap-net CPUE, PSD, RSD-P and mean Wr in Lake Thompson, Kingsbury County, 2000-2009.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	11.6	5.4	13.0	1.3	1.4	2.5	0.8	1.1	1.8	0.1	3.9
PSD	94	96	18	100	97	100	--	100	100	--	88
RSD-P	24	74	16	22	19	100	--	92	65	--	52
Mean Wr	128	122	125	114	92	107	--	106	103	--	112

\*10 years (1999-2008)

## **Northern Pike**

As with other species, northern pike recruitment has been lacking due to declining water levels. CPUE will probably stay low (Table 11) until water levels increase and a successful spawn occurs. The mean length of sampled fish in 2009 was 713 mm (28.1 in) (Figure 4).

**Table 11.** Northern pike trap-net CPUE, PSD, RSD-P and mean Wr in Lake Thompson, Kingsbury County, 2000-2009.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	7.6	3.9	4.0	5.1	0.9	4.7	0.8	0.5	1.3	1.1	3.5
PSD	84	97	82	28	--	96	--	--	93	85	79
RSD-P	24	5	28	19	--	38	--	--	64	46	27
Mean Wr	87	89	84	72	--	80	--	--	76	75	82

\*10 years (1999-2008)

## **All Species**

Overall, CPUE for most species remained low in 2009 (Table 11) due to poor reproduction and recruitment caused by several years of decreasing water levels. White bass which are new to Lake Thompson are increasing.

**Table 12.** Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in Lake Thompson, Kingsbury County, 2000-2009.

<b>Species</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
<b>SPS (GN)</b>	1.3	2.2	1.0		3.0		0.8	0.5		3.2
<b>SPS (TN)</b>										
<b>COC (GN)</b>	4.0	2.2	5.0	0.7	0.7	4.0	10.5	7.3	3.8	3.2
<b>COC (TN)</b>	11.9	4.1	4.2	5.1	5.8	3.7	4.2	13.7	7.5	0.7
<b>WHS (GN)</b>	3.7	0.7	0.3	0.2		0.8	0.3			
<b>WHS (TN)</b>	1.8	0.9	0.3		0.3	0.5			0.3	0.2
<b>BIB (GN)</b>								0.3	2.0	0.2
<b>BIB (TN)</b>								0.2	0.4	1.8
<b>BLB (GN)</b>	50.7	5.5	141.7	154.5	10.8					
<b>BLB (TN)</b>	59.7	145.1	292.4	122.1	4.0	2.3	0.7	0.1		
<b>NOP (GN)</b>	1.7	0.7	1.7	0.8	0.8	0.3	1.5		0.2	0.4
<b>NOP (TN)</b>	7.6	3.9	4.0	5.1	0.9	4.7	0.8	0.5	1.3	1.1
<b>WHB (GN)</b>							0.3			3.2
<b>WHB (TN)</b>										
<b>BLG (GN)</b>										
<b>BLG (TN)</b>		0.1								
<b>SMB (GN)</b>	0.3	0.7	1.7	0.3	0.2	0.8	0.3	0.3		
<b>SMB (TN)</b>	1.7	0.3	1.8	2.0	0.3	0.2	0.4	0.4	0.3	0.8
<b>BLC (GN)</b>	0.3	9.5	4.3	0.3	0.8	0.5	1.0	0.3		0.2
<b>BLC (TN)</b>	11.6	5.4	13.0	1.3	1.4	2.5	0.8	1.1	1.8	0.1
<b>YEP (GN)</b>	34.7	45.2	54.7	6.5	16.3	7.3	3.3	4.0	2.8	3.8
<b>YEP (TN)</b>	0.3	0.4	0.4	0.3					0.1	
<b>WAE (GN)</b>	43.3	49.0	31.7	22.8	16.0	34.0	26.0	26.5	12.8	21.8
<b>WAE (TN)</b>	4.5	5.2	7.3	6.9	1.6	26.5	1.2	3.5	14.1	9.0

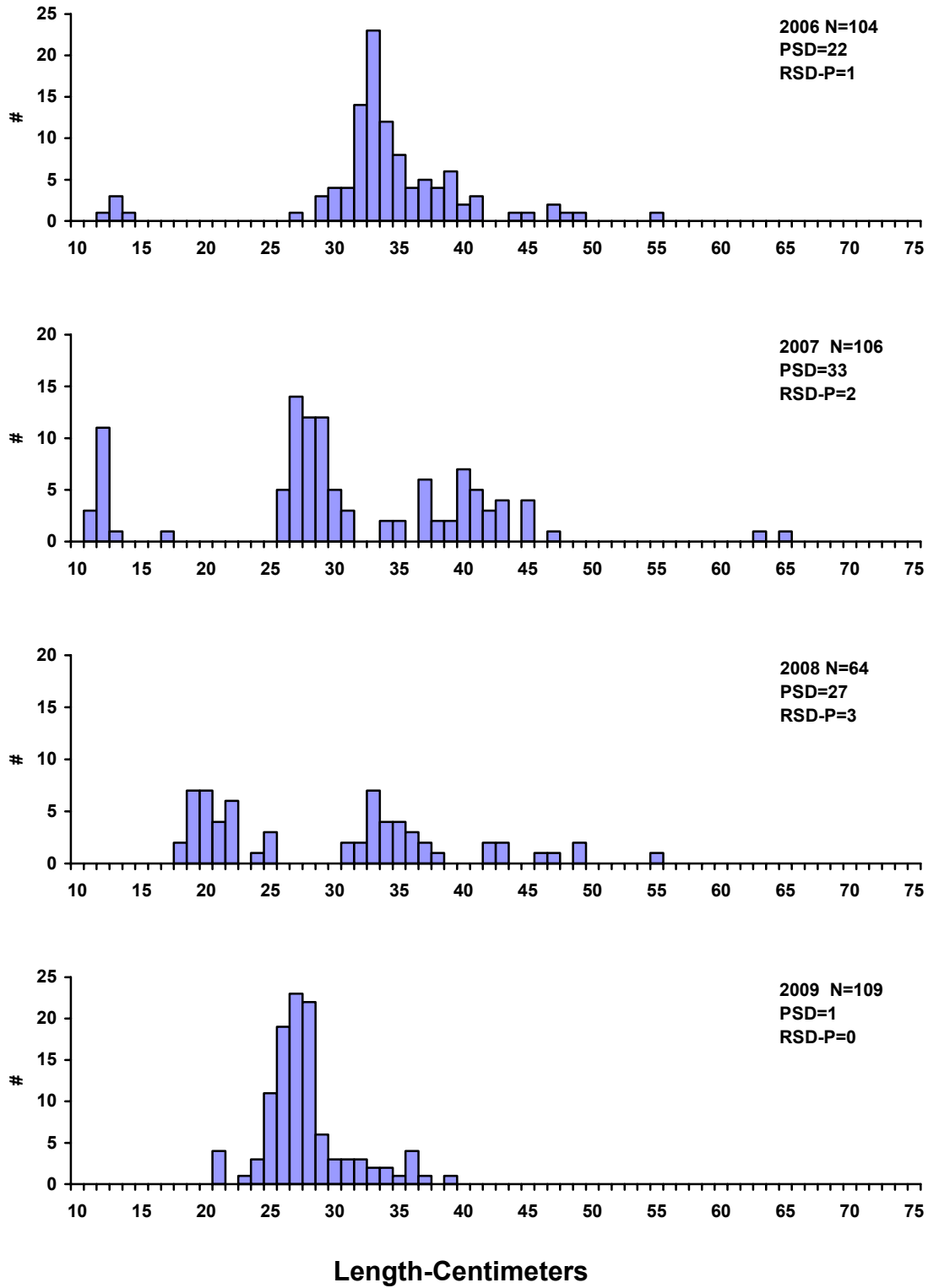
SPS (Spottail Shiner), COC (Common Carp), WHS (White Sucker), BIB (Bigmouth Buffalo), BLB (Black Bullhead), NOP (Northern Pike), WHB (White Bass), BLG (Bluegill), SMB (Smallmouth Bass), BLC (Black Crappie), YEP (Yellow Perch), WAE (Walleye)

## **MANAGEMENT RECOMMENDATIONS**

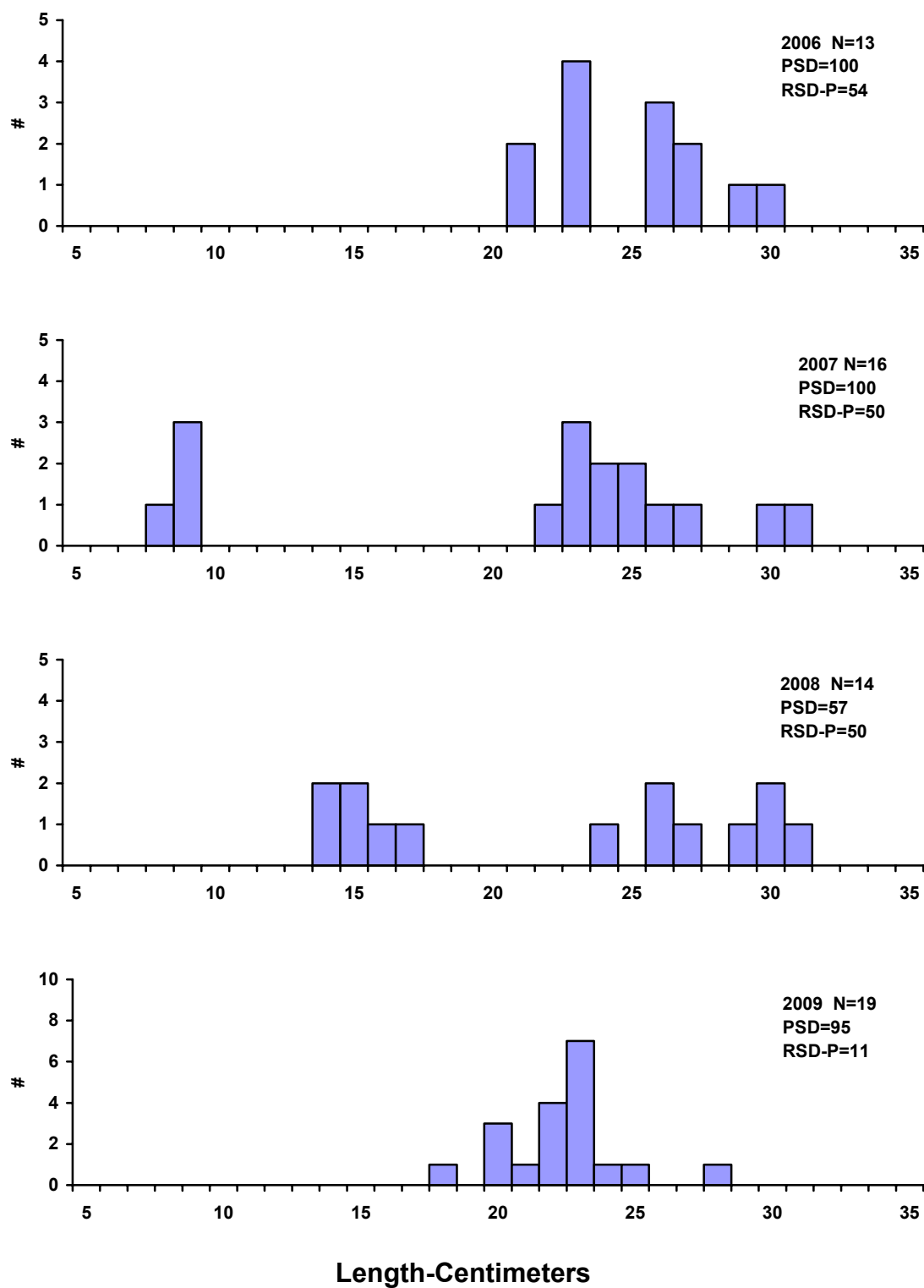
1. Continue to monitor general fish populations in Lake Thompson with annual netting surveys and conduct fall electrofishing surveys to monitor walleye recruitment.
2. Stock walleye fry when fall electrofishing indicates failed natural reproduction.
3. Maintain usable access during low water periods.

**Table 13.** Stocking record for Lake Thompson, Kingsbury County, 1991-2009.

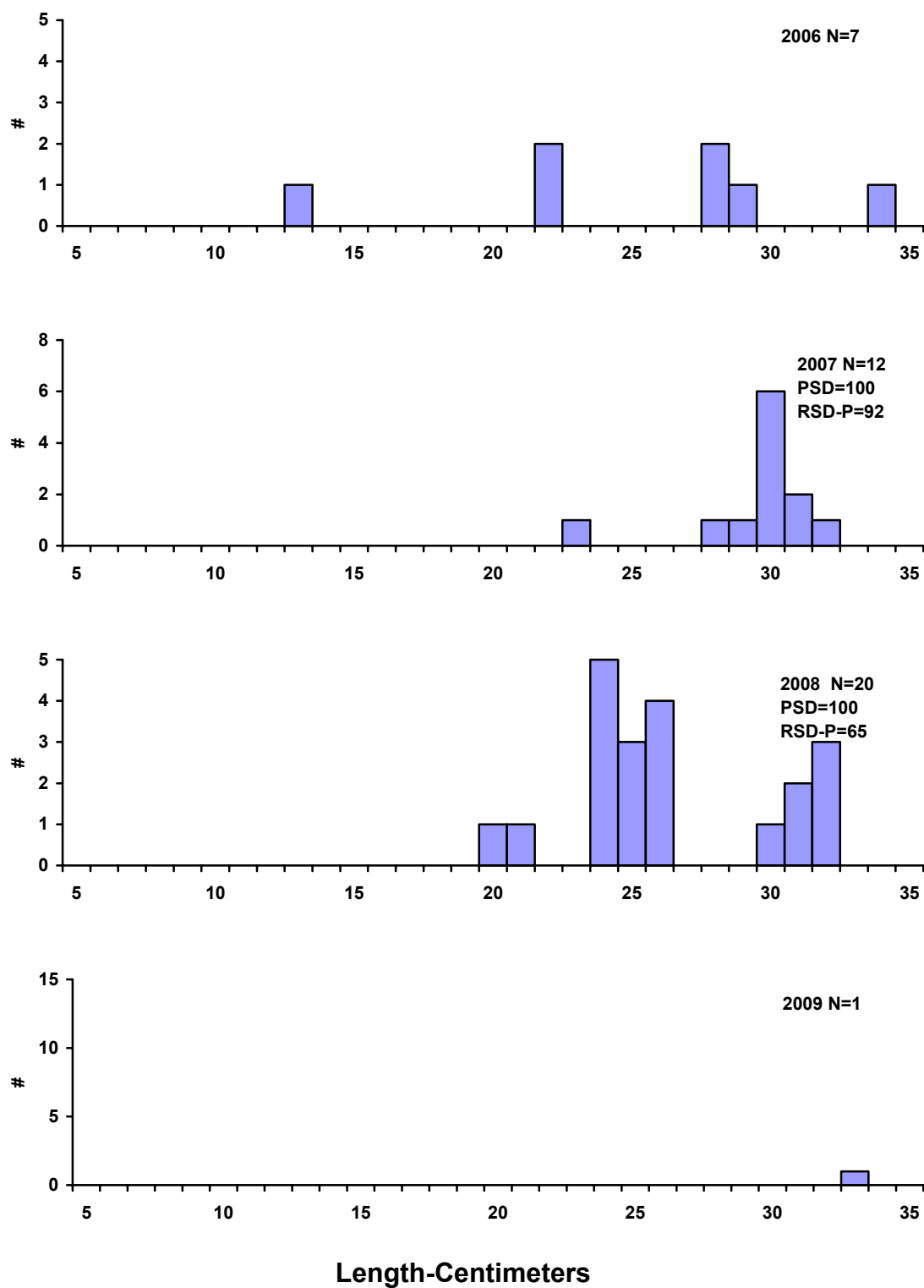
<b>Year</b>	<b>Number</b>	<b>Species</b>	<b>Size</b>
1991	283	Walleye	Adult
	52,038	Largemouth Bass	Sml. Fingerling
	10,850	Largemouth Bass	Med. Fingerling
	30,000	Smallmouth Bass	Fingerling
	160	Gizzard Shad	Adult
1995	60,000	Largemouth Bass	Fingerling
	100,000	Smallmouth Bass	Fingerling
1996	99,270	Largemouth Bass	Fingerling
	151,870	Smallmouth Bass	Fingerling
2004	10,000,000	Walleye	Fry
2006	6,250,000	Walleye	Fry
	17,935	Walleye	Lrg. Fingerling



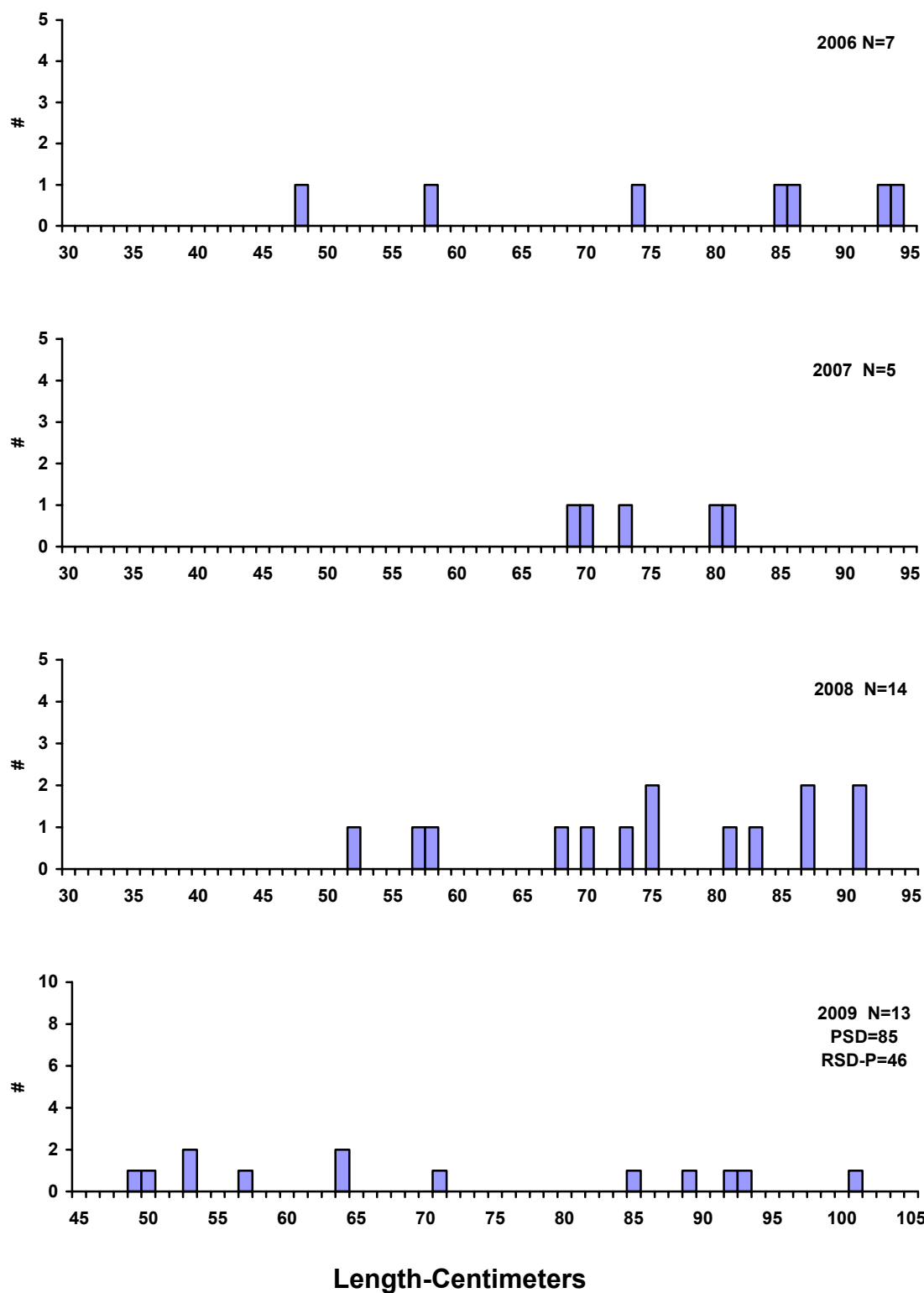
**Figure 1.** Length frequency histograms for walleye sampled with gill nets in Lake Thompson, Kingsbury County, 2006-2009.



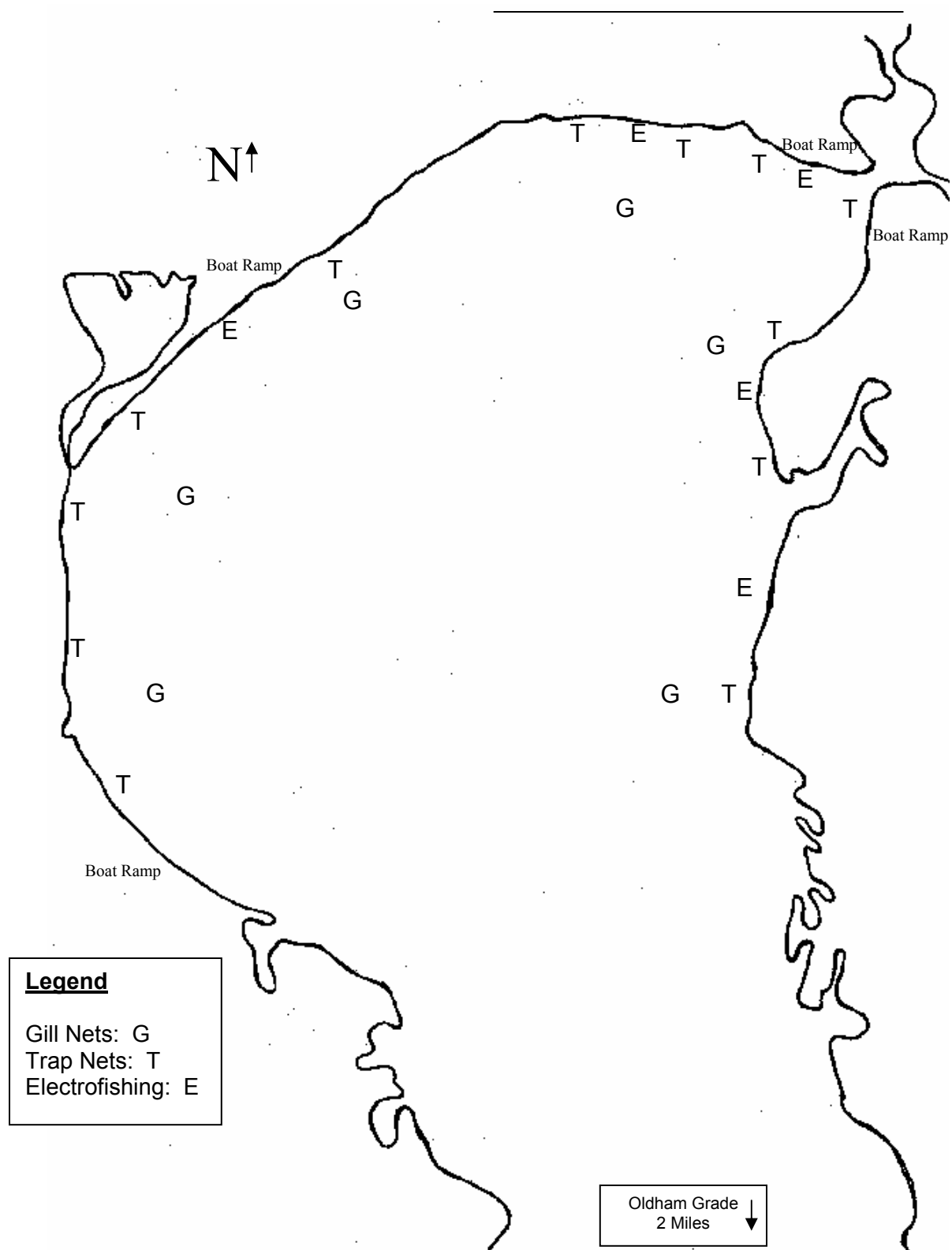
**Figure 2.** Length frequency histograms for yellow perch sampled with gill nets in Lake Thompson, Kingsbury County, 2006-2009.



**Figure 3.** Length frequency histograms for black crappies sampled with trap nets in Lake Thompson, Kingsbury County, 2006-2009.



**Figure 4.** Length frequency histograms for northern pike sampled with trap nets in Lake Thompson, Kingsbury County, 2006-2009.



**Figure 8.** Sampling locations on Lake Thompson, 2009.

**Appendix A.** A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

**Catch Per Unit Effort (CPUE)** is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

**Proportional Stock Density (PSD)** is calculated by the following formula:

$$\text{PSD} = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

**Relative Stock Density (RSD-P)** is calculated by the following formula:

$$\text{RSD-P} = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters.

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25	38	51	63	76
Sauger	20	30	38	51	63
Yellow perch	13	20	25	30	38
Black crappie	13	20	25	30	38
White crappie	13	20	25	30	38
Bluegill	8	15	20	25	30
Largemouth bass	20	30	38	51	63
Smallmouth bass	18	28	35	43	51
Northern pike	35	53	71	86	112
Channel catfish	28	41	61	71	91
Black bullhead	15	23	30	38	46
Common carp	28	41	53	66	84
Bigmouth buffalo	28	41	53	66	84
Smallmouth buffalo	28	41	53	66	84

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For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

**Relative weight (Wr)** is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.